

REMARKS/ARGUMENTS

Claims 1-43 are subject to a restriction requirement in the outstanding Official Action. Claims 1, 22 and 23 have been amended and therefore claims 1-43 are the only claims remaining in this application.

Applicants elect Species A directed to claims 1-3 and 5-43, but the election is with a strong traverse based upon the Examiner's misunderstanding of the patentability of claim 1.

Traversal of the Election Requirement

The Examiner's indication that claim 1 is generic to all species is very much appreciated. However, Applicants also believe claims 22 and 23 are generic to all species (there is no "discrete" or "monolithic" limitation contained in these claims. Clarification as to which claims are believed generic is respectfully requested.

The Examiner bases his restriction requirement on the contention that generic claim 1 "is not inventive in itself as patent # 5,917,596 teaches laser (24), modulation means to intensity modulate radiation (38, as splitting a beam affects the beam intensity), and hollow core waveguide structure (12) in a substrate." Presumably, this conclusion is necessary in order for the Examiner to find that there is no patentable linking between claims 1, 22 and 23 and claims dependent thereon. This contention by the Examiner is respectfully traversed.

Applicants attach hereto page 763 from Webster's Ninth New Collegiate Dictionary which includes the definition of "modulate" to be "to vary the amplitude, frequency, or phase of (a carrier wave or a light wave) for the transmission of intelligence (as by radio)." Applicant also includes the definition of "modulate" on page 1284 of the McGraw-Hill Dictionary of Scientific and Technical Terms dictionary which means "to vary the amplitude, frequency, or

phase of a wave, or vary the velocity of the electrons in an electron beam in some characteristic manner.” The same Dictionary on page 1285 includes the definition of “modulation” as “the process or the result of the process by which some parameter of one wave [the carrier] is varied in accordance with some parameter of another wave [the modulating signal].”

Applicant’s specification also defines “modulation” as “to carry information.” (Page 1, second paragraph). Applicants’ independent claims all specify “information modulating” consistent with the description of “modulation” in the above dictionaries and consistent with the definition in the specification.

Moreover, those of ordinary skill in the art will be well aware of the above definition, but Applicants have clearly included it in the three independent generic claims. While it is noted that all claims recite “information modulated radiation,” claim 1 recites a “modulation means” which is a clear reference to means-plus-function format. Given the presumption of means-plus-function format since Applicants have used the word “means,” the Examiner is obligated to construe this structure to cover the corresponding structures in Applicants’ specification and equivalents thereto.

However, even if the Examiner believes sufficient structure has been recited in independent claim 1, it is clear that the radiation must be “information” modulated, i.e., there must be some information impressed upon the radiation by means of variations in amplitude, frequency or phase or other modulating means. Because this structure is positively recited in each of Applicants’ three independent claims, it is incumbent upon the Examiner to determine whether this is disclosed in U.S. Patent 5,917,596, i.e., the Jenkins et al patent.

A review of the Jenkins patent will indicate that, contrary to the Examiner's contention, there is no disclosure of any "modulation means." While the Examiner correctly notes that a beam splitter 38 will divide an existing intensity beam into two or more beams of lesser intensity, there is no "information" impressed upon either of the split beams. As the input beam has a generally consistent intensity, the split beams will be of general consistent intensities as well, although the sum of the split beam intensities will be equal to or less than that of the original beam intensity.

Because each of the split beams in Jenkins '596 is a relatively constant beam, by definition there is no "information" modulation of the beams. Therefore Jenkins '596 fails to anticipate or render obvious the subject matter of Applicants' independent claims 1, 22 and 23. Accordingly, the Examiner's conclusion that Jenkins '596 anticipates or renders obvious the subject matter of generic claims 1, 22 and 23 is respectfully traversed, and the Examiner is respectfully requested to take judicial notice of the definition of "modulating" as set out in the attached dictionary definitions as well as the definition contained in Applicants' specification.

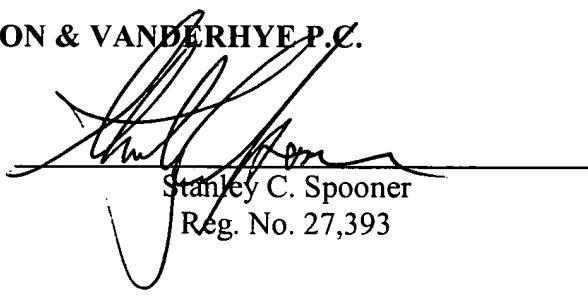
Should the Examiner dispute the definition of "modulating" in the dictionaries and/or the specification, he is respectfully requested to provide some evidence of any definition which does not require "information" to be impressed on the carrier. If the Examiner accepts the definition as noted above, he is respectfully requested to identify where any beam in Jenkins '596 has any modulation impressed on it by the beamsplitter. The Examiner is also requested to admit that beamsplitters do not normally modulate a laser signal, or, if not admitted, provide evidence to the contrary.

Applicants have elected with traverse Species A and has noted that claims 1-3 and 5-43 appear to read thereon. Applicants have also noted that in addition to claim 1 being generic, claims 22 and 23 are also believed to be generic. Accordingly, in view of the fact that claims 1, 22 and 23 are believed clearly allowable over the Jenkins '596 reference, there is believed to be a single general inventive concept under PCT Rule 13.1 and accordingly the restriction requirement is improper and is respectfully traversed.

Having responded to all objections and rejections set forth in the outstanding Official Action, it is submitted that claims 1-43 are in condition for allowance and notice to that effect is respectfully solicited. In the event the Examiner is of the opinion that a brief telephone or personal interview will facilitate allowance of one or more of the above claims, he is respectfully requested to contact Applicants' undersigned representative.

Respectfully submitted,

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Enclosures:

Page 763, Webster's Ninth New Collegiate Dictionary definition "modulate"
Page 1284, McGraw-Hill Scientific and Technical Terms definition "modulate"
Page 1285, McGraw-Hill Scientific and Technical Terms definition "modulation"

ary verb (as *can*, *must*, *might*) or a verb of predication and etc. English differs formally from

1: a: the quality or state of tribute: FORM 2: the classifying to their asserting or denying, or necessity of their content (as vision) 4: a usu: physical

measure, manner, musical arrangement of the eight according to one of several fixed imical scheme (as in 13th and LL *modus*, fr. L) a: 'MODIFI-1- enal of a logical proposition 4: thing; b: a form or manner of ordinary, or preferred way of dolemin ~) 6: a: a manifesta- xif: a particular form or man-

b: a particular functioning pacecraft in reentry ~) (a the most frequent value of a set for which a function of prob- e maximum 8: any of various an elastic body or oscillatory airplane propeller blade) (the waveguide) 9: the actual min- HOD

revaling fashion or style (as of

Olt *modello*, fr. (assumed) VE, fr. *modus*) (1575) 1: obs: a set BY, IMAGE 3: structural design 4: a miniature representation something to be made 5: an: a person or thing that serves poses for an artist 7: ARCHI- ence a mimic imitates 9: one other merchandise MANNEQUIN: a type or design of product (as or analogy used to help visualize directly observed 12: a sys- es presented as a mathematical

4PL. IDEAL mean someone or e- or imitation: MODEL applies to hy of imitation; EXAMPLE applies contexts on no account to be uring; PATTERN suggests a clear EXEMPLAR suggests either a fault- et typification; IDEAL implies the reality or in conception.

eling or model-line 'mäd-lin, after a pattern: SHAPE 2 *archae* army, government, or parish) 3: terial b: to produce a represent- puter to ~ a problem) 4: to particular model (~ed its consti- play by wearing, using, or posing n or imitate forms; make a pat- or act as a fashion model —

pable of serving as a pattern (a ~ sentation of something (a ~ air-

emulator) (ca. 1952): a device a form compatible with another ing computer data over telephone

L moderatus, fr. pp. of *moderare*) (15c) 1: a: avoiding ex- observing reasonable limits. (a ~ a: tending toward the mean or average or less than average remote political or social measures spe or effect 5: not expensive color: of medium lightness and — moderateness n

it-ing vt (15c) 1: to lessen the moderated the chill) 2: to preside: to act as a moderator 2: to use — mod-er-a-tion. 'mäd-a-rä-

one who holds moderate views or moderate course or program (as in

aving a speed of 13 to 18 miles per

ving a speed of 32 to 38 miles per

adj [It, fr. L *moderatus*] (ca. 1724) music to indicate tempo

1: one who arbitrates: MEDIA- sembly, meeting, or discussion: as tyerian governing body b: the in meeting c: the chairman of a graphite used for slowing down era-torship -ship) n

adj [LL *modernus*, fr. L *modo* just IETE] (1585) 1: a: of, relating to, from a relevant remote past to or characteristic of the present or 2: involving recent techniques,

methods; or ideas: UP-TO-DATE 3: cap: of, relating to, or having the characteristics of the present or most recent period of development of a language syn see NEW — modernity 'mäd-orn-täy adj — modernness 'mäd-näss\ n — modern n (1585) 1: a person of modern times or views 2: a style of printing type distinguished by regularity of shape, precise curves, straight hairline serifs, and heavy downstrokes

Modern Hebrew n (1949): Hebrew as used in present-day Israel

modern-ism 'mäd-orn-niz-äm\ n (1737) 1: a practice, usage, or expression peculiar to modern times 2: often cap: a tendency in theology to accommodate traditional religious teaching to contemporary thought and esp. to devalue traditional supernatural elements 3: modern artistic or literary philosophy and practice; esp: a self-conscious break with the past and a search for new forms of expression — modern-ist 'näst\ n or adj — modern-istic 'mäd-orn-nis-tik\ adj — modern-ization 'mäd-orn-na-zä-shän\ n (1770) 1: the act of modernizing: the state of being modernized 2: something modernized: a modernized version

modern-style 'mäd-orn-niz\ vb -ized; -izing vt (1748) 1: to make modern in taste, style, or usage ~ vi: to adopt modern ways — modern-izer

n — modern pentathlon n (1943): a composite contest in which all contestants compete in a 300-meter freestyle swim, a 4000-meter cross-country run, a 5000-meter 30-jump equestrian steeplechase, épée fencing, and target shooting at 25 meters

modest 'mäd-est\ adj [L *modestus* moderate; akin to L *modus* measure] (1565) 1: a: placing a moderate estimate on one's abilities or worth b: neither bold nor self-assertive: tending toward diffidence 2: arising from or characteristic of a modest nature 3: observing the proprieties of dress and behavior: DECENT 4: a: limited in size, amount, or scope b: UNPRETENTIOUS (~ a cottage) syn see SHY, CHASTE — modestly adv

modesty 'mäd-ä-stë\ (15c) 1: freedom from conceit or vanity 2: propriety in dress, speech, or conduct

modi-cum 'mäd-i-käm\ n [ME, fr. L neut. of *modicus* moderate, fr. *modus* measure] (15c) a: a small portion: a limited quantity

modi-fi-ca-tion 'mäd-i-fä-kä-shän\ n (1603) 1: the limiting of a statement: QUALIFICATION 2: 'MODE 6a 3: a: the making of a limited change in something; also: the result of such a change b: a change in an organism caused by environmental factors

modi-fier 'mäd-i-fä-yör\ n (1583) 1: one that modifies 2: a grammatical qualifier 3: a gene that modifies the effect of another

modi-fy 'mäd-i-fä-yid; -fy-ing [ME *modifien*, fr. MF *modifier*, fr. L *modificare* to measure, moderate, fr. *modus*] vt (14c) 1: to make less extreme: MODERATE 2: a: to limit or restrict the meaning of esp. in a grammatical construction: QUALIFY b: to change (a vowel) by umlaut 3: a: to make minor changes in b: to make basic or fundamental changes in often to give a new orientation to or to serve a new end (the wing of a bird is an arm *modified* for flying) ~ vi: to undergo change syn see CHANGE — modi-fi-ability 'mäd-i-fä-bil-i-tät\ n — modi-fi-able 'mäd-i-fä-bil-i-bal\ adj

modi-fy-ling 'mäd-i-fä-yün\ n [It *modiglione*] (1563): an ornamental block or bracket under the corona of the cornice (as in the Corinthian order)

modi-ly 'mäd-i-sh\ adj (1660) : FASHIONABLE, STYLISH (a ~ hat) (a ~ writer) — modi-ly-adv — modi-ly-ness n

modi-stic 'mäd-i-dëst\ n [F, fr. mode style, mode] (1840): one who makes and sells fashionable dresses and hats for women

modi-tili-ty 'mäd-i-tä-bil-i-tät\ n (1928): the capability of being modulated

modi-tilar 'mäd-i-tä-lär\ adj (1798) 1: of, relating to, or based on a module or a modulus 2: constructed with standardized units or dimensions for flexibility and variety in use — modi-tilar-i-ty 'mäd-i-tä-lät\ n — modi-tilar-ly 'mäd-i-tä-lär-ly\ adj

modular arithmetic n (1959): arithmetic that deals with whole numbers where the numbers are replaced by their remainders after division by a fixed number (in a modular arithmetic with modulus 5, 3 multiplied by 4 would be 2) (5 hours after 10 o'clock is 3 o'clock because clocks follow a modular arithmetic with modulus 12)

modi-tilar 'mäd-i-tä-lär-iz\ adj (1959) 1: containing or consisting of modules (~ electronic equipment) 2: produced in the form of modules

modi-tilate 'mäd-i-tä-lät\ vb -lated; -lat-ing [L *modulatus*, pp. of *modulari* to play, sing, fr. *modulus* small measure, rhythm, dim. of *modus* measure — more at METE] vt (1615) 1: to tune to a key or pitch 2: to adjust to or keep in proper measure or proportion: TEMPER 3: to vary the amplitude, frequency, or phase of (a carrier wave or a light wave) for the transmission of intelligence (as by radio); also: to vary the velocity of electrons in an electron beam) ~ vi 1: to play or sing with modulation 2: to pass from one musical key into another by means of intermediary chords or notes that have some relation to both keys 3: to pass gradually from one state to another — modi-tila-tor 'tä-lät\ n — modi-tila-to-ry 'tä-lät-ör\ adj

modi-tilation 'mäd-i-tä-shän\ n (1531) 1: a: a regulating according to measure or proportion: TEMPER 2: an inflection of the tone, or pitch of the voice; specif: the use of stress or pitch to convey meaning 3: a change from one musical key to another by modulating 4: the process of modulating a carrier or signal (as in radio); also: the result of this process

modi-ule 'mäd-i-yü\ n [L *modulus*] (1586) 1: a standard or unit of measurement 2: the size of some one part taken as a unit of measure by which the proportions of an architectural composition are regulated 3: a: any in a series of standardized units for use together: as (1) a unit of furniture or architecture (2): an educational unit which covers a single subject or topic b: a usu: packaged functional assembly of electronic components for use with other such assemblies 4: an independently-operable unit that is a part of the total structure of a space vehicle 5: a: a subset of an additive group that is also a group under addition b: a mathematical set that is a commutative group, under addition and that is closed under multiplication which is distributive from the left or right or both by elements of a ring and for which $(ab)x = (ab)x$ or $(xb)a = x(ba)$ or both where a and b are elements of the ring and x belongs to the set

modi-ol 'mäd-i-yü\ prep [NL, abl. of *modulus*] (1897): with respect to a modulus of (19 and 54 are congruent ~)

modi-ulus 'mäj-i-lüs\ n, pl -li, -lüs [NL, fr. L, small measure] (1753) 1: a: the factor by which a logarithm of a number to one base is multiplied to obtain the logarithm of the number to a new base b: ABSOLUTE VALUE 2: c (1) : the number (as a positive integer) or other mathematical entity (as a polynomial) in a congruence that divides the difference of the two congruent members without leaving a remainder — compare RESIDUUS b: (2) : the number of different numbers used in a system of modular arithmetic 2: a constant or coefficient that expresses usu: numerically the degree in which a property (as elasticity) is possessed by a substance or body

modi-ous oper-ant-di 'mäd-i-säp-sä-rän-dë, -dë\ n, pl mo-di-ous operandi 'mäd-i-de-ap, -mäd-i-di\ n [NL] (1654): a method of procedure

modi-ous vi-vi-den 'mäd-i-sä-vän-dë, -dë\ n, pl mo-di-ous vivi-den 'mäd-i-dë, -mäd-i-di\ [NL, manner of living] (1879) 1: a feasible arrangement or practical compromise esp: one that bypasses difficulties 2: a manner of living: a way of life

Mogen David, var of MAGEN DAVID

mo-gul 'mäg-gü\ n [prob. of Scand. origin; akin to Norw. dial. *muge* heap, fr. ON *mugi* — more at MOW] (ca. 1959): a bump in a ski run

mo-hair 'mä-häär, -heär\ n [modif. of obs. It *moacarro*, fr. Ar *mukhayar*, lit. choice] (1570): a fabric or yarn made wholly or in part of the long silky hair of the Angora goat; also: this hair

Mo-ham-medan var of MUHAMMAD

Mo-hawk 'mä-häk\ n [prob. of Mongol *mogol*] (1588) 1: a: an Indian Muslim or of descended from one of several conquering groups of Mongol, Turkish, and Persian origin; esp: the sovereign of the empire founded in India by the Moguls in the 16th century 2: a great personage: MAGNATE — mogul adj, often cap

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Mo-ham-medan var of MUHAMMAD

Mo-hawk 'mä-häk\ n [prob. of Mohawk or Mohawks [of Algonquian origin; akin to Narraganset *Moawocuuck*] (1634) 1: a: an American Indian people of the Mohawk river valley, New York b: a member of this people 2: the language of the Mohawk people

Mo-he-gan 'mä-hä-gän, -mä\ or Mo-hic-an 'hä-kän\ n, pl Mohegan or

Mohegan or Mohican or Mohicans (1614): a member of an American Indian people of southeastern Connecticut

Mo-hi-can 'mä-hä-kän, mä\ var of MAHICAN

Mo-ho 'mä-hö\ n [short for *Mohorovicic discontinuity*, fr. Andrija Mohorovicic] (1936) Yugoslavia geologist] (ca. 1952): a point ranging from about 3 miles (5 kilometers) beneath the ocean basin floor to about 25 miles (40 kilometers) beneath the continental surface at which seismological studies indicate a transition in earth materials from those of the earth's crust to those of the subjacent mantle

Mo-hock 'mä-häk\ n [alter. of *Mohawk*] (1711): one of a gang of aristocratic ruffians who assaulted and otherwise maltreated people in London streets in the early 18th century — Mo-hock-ism 'ä-iz-äm\ n

Mo-ho-ro-vicic discontinuity 'mä-hö-hä-rö-vä-chich\ n (1936): MOHO Mohs' scale 'mäd-, 'mä-, 'mä-säz\ n [Friedrich Mohs *1839* Ger. mineralogist] (1879) 1: a scale of hardness for minerals in which 1 represents the hardness of talc; 2: gypsum; 3, calcite; 4, fluorite; 5, apatite; 6, orthoclase; 7, quartz; 8, topaz; 9, corundum; and 10, diamond 2: a revised and expanded version of the original Mohs' scale in which 1 represents the hardness of talc; 2, gypsum; 3, calcite; 4, fluorite; 5, apatite; 6, orthoclase; 7, quartz; 8, topaz; 9, corundum; and 10, diamond 2: a revised and expanded version of the original Mohs' scale in which 1 represents the hardness of talc; 2, gypsum; 3, calcite; 4, fluorite; 5, apatite; 6, orthoclase; 7, quartz; 8, topaz; 9, corundum; and 10, diamond

mo-hur 'mäf-är, mä-hüür\ n [Hindi *muhr* gold coin, seal, fr. Per: akin to Skt *madra* seal] (1690): a former gold coin of India and Persia equal to 15 rupees

moi-ety 'mäi-ät\ n, pl -ties [ME *moite*, fr. MF *moit  *, fr. LL *mediata*, *medietas*, fr. L *medius* middle — more at MID] (15c) 1: a: one of two equal parts: MOHAL b: one of two approximately equal parts 2: one of the portions into which something is divided: COMPONENT, PART 3: one of two basic complementary tribal subdivisions

moi-l 'mäi(l)\ vb [ME *moilen*, fr. MF *moillier*, fr. (assumed) VL *molliare*, fr. L *molli* soft — more at MELT] vt, chiefly dial (15c): to make wet or dirty ~ vi: to work hard: DRUDGE 2: to be in continuous agitation: CHURN, SWIRL — moi-ler n

moi-l 'mäi(l)\ n (ca. 1612) 1: hard work: DRUDGERY 2: CONFUSION, TURMOIL

moi-ling 'mäi-ling\ adj (1603) 1: a: requiring hard work b: INDUS-TRIOUS 2: violently agitated: TURBULENT — moi-ling-ly 'ä-ling-ly\ adv

moi-ral 'mäi-rä\ n pl [Gk, fr. pl of *moiros* lot, fate; akin to Gk *meros* part — more at MERIT] : FATE 4

moire 'mäi-r  , -är\ n [Fr. *moir  * like moire, fr. *moire*] (1818) 1: a: an irregular wavy finish on a fabric b: a rippled pattern on a stamp 2: a fabric having a wavy watered appearance 3: an independent usu. shimmering pattern seen when two geometrically regular patterns (as two sets of parallel lines or two halftone screens) are superimposed esp. at an acute angle — moi   adj

moist 'mäist\ adj [ME *moiste*, fr. MF *moist  *, alter. of L *moicidus* slimy, fr. *mucus* nasal mucus] (14c) 1: slightly or moderately wet: DAMP 2: TEARFUL 3: characterized by high humidity syn see WET — moist-ly adv — moist-ness 'mäis-näss\ n

mois-ten 'mäis-t  n\ vb moistened; moist-en-ing 'mäis-niñ, -n-iñ\ vt (14c) to make moist ~ vi: to become moist — moist-en-er 'mäis-när, -n-är\ n

mois-ture 'mäis(h)-ch  r\ n [ME, modif. of MF *moisture*, fr. *moiste*] (14c) liquid diffused or condensed in relatively small quantity

mois-tur-ize 'ch  -r  z, -r  z\ vt -ized; -izing (1945): to add moisture to (~ the air) — mois-tur-izer n

moke 'm  k\ n [origin unknown] (1848) 1: slang Brit: DONKEY 2: slang

Austral: NAG

mol-al 'm  l-ä\ adj [?mole] (1905): of, relating to, or containing a mole of solute per 1000 grams of solvent — mol-al-i-ty 'm  l-äl-ät\ n

— abut ~ kitten, F table ~ further ~ ash ~ ace ~ cot, cart ~ out ~ ch\ chin ~ bet ~ easy ~ go ~ hit ~ ice ~ job ~ sing ~ go ~ law ~ boy ~ th\ thin ~ the ~ loot ~ foot ~ yet ~ zh\ vision ~ ä, ~, ö, ~, ü, ~, ü ~ see Guide to Pronunciation

Treatment of molten aluminum alloys containing 8–13% silicon with small amounts of a sodium fluoride or sodium chloride mixture; improves mechanical properties. [MOL BIO] In nucleic acid metabolism, any changes made to deoxyribonucleic acid or ribonucleic acid after their original incorporation into a polynucleotide chain. [SCI TECH] Any change brought about by external or internal factors. [,mäd'ə-fə'kärshən]

modification kit [ENG] A collection of items not all having the same basic name which are employed individually or conjunctively to alter the design of a component or equipment. [,mäd'ə-fə'kärshən ,kit]

modified asphalt [MATER] Asphalt modified by addition of a rosin ester or synthetic resin. ['mäd'ə,fid 'as,folt]

modified Bessel equation [MATH] The differential equation $z^2 f''(z) + z f'(z) - (z^2 + n^2) f(z) = 0$, where z is a variable that can have real or complex values and n is a real or complex number. [,möd'ə,fid 'bes'əl i,kwā-zhan]

modified Bessel functions [MATH] The functions defined by $I_v(x) = \exp(-iv\pi/2) J_v(ix)$, where J_v is the Bessel function of order v , and x is real and positive. ['mäd'ə,fid 'bes'əl ,fənk'shənz]

modified base [MOL BIO] A nucleotide that is an altered form of the usual four nucleic acid bases. ['mäd'ə,fid 'bās]

modified betatron [NUCLEO] A betatron in which the orbital stability properties of the beam are improved by adding a toroidal magnetic field. ['mäd'ə,fid 'bād'ə,trān]

modified constant-voltage charge [ELEC] Charging of a storage battery in which the voltage of the charging circuit is held substantially constant, but a fixed resistance is inserted in the battery circuit producing a rising voltage characteristic at the battery terminals as the charge progresses. ['mäd'ə,fid 'kān'stānt 'vōltij 'chārj]

modified exponential curve [STAT] The equation resulting when a constant is added to the exponential curve equation; used to estimate trend in a nonlinear time series. ['mäd'ə,fid 'ek-sپا'nefchāl 'kərv]

modified gunmetal [MET] Gunmetal containing about 2.5% lead; used for gears and bearings. ['mäd'ə,fid 'gən,med'əl]

modified Hankel functions [MATH] The functions defined by $K_v(x) = (i\pi/2) \exp(iv\pi/2) H_v^{(1)}(ix)$, where $H_v^{(1)}$ is the first Hankel function of order v , and x is real and positive. Also known as MacDonald functions. ['mäd'ə,fid 'hān'kəl ,fənk'shənz]

modified index of refraction [METEOROL] An atmospheric index of refraction mathematically modified so that when its gradient is applied to energy propagation over a hypothetical flat earth, it is substantially equivalent to propagation over the true curved earth with the actual index of refraction. Also known as modified refractive index; refractive modulus. ['mäd'ə,fid 'in,deks əv ri'frak'shən]

modified Julian date [ASTRON] The Julian date minus 2,400,000.5. Abbreviated MJD. ['mäd'ə,fid 'jü'l-yən 'dāt]

modified Lambert conformal chart [MAP] A chart on the modified Lambert conformal projection. Also known as Ney's chart. ['mäd'ə,fid 'lām'bərt kən'fɔrməl 'chārt]

modified Lambert conformal projection [MAP] A modification of the Lambert conformal projection for use in polar regions, one of the standard parallels being at latitude $89^{\circ}59'58''$ and the other at latitude 71° or 74° , and the parallels being expanded slightly to form complete concentric circles. Also known as Ney's projection. ['mäd'ə,fid 'lām'bərt kən'fɔrməl pr'jek'shən]

modified Lewis acid [PHYS CHEM] An acid that is a halide ion acceptor. ['mäd'ə,fid 'lū'əs 'as'əd]

modified mean [STAT] A mean computed after elimination of observations judged to be atypical. ['mäd'ə,fid 'mēn]

modified precision approach radar [NAV] A special precision radar approach landing procedure for high performance aircraft; radar guidance is provided to a landing flare point instead of a runway touchdown point. ['mäd'ə,fid prə'sizhən ə'prōch 'rā,dār]

modified rayon [TEXT] A woollike rayon fiber made with additives in the spinning solution. ['mäd'ə,fid 'rā,ān]

modified refractive index See modified index of refraction. ['mäd'ə,fid ri'frak'tiv 'in,deks]

modifier [COMPUT SCI] A quantity used to alter the address of an operand in a computer, such as the cycle index. Also known as index word. [MATER] In flotation, any of the chemicals which increase the specific attraction between collector agents

and particle surfaces or which increase the wettability of those surfaces. ['mäd'ə,fir'er]

modifier gene [GEN] A gene that alters the phenotypic expression of a nonallelic gene. ['mäd'ə,fir'er jēn]

modifier register See index register. ['mäd'ə,fir'er ,rej'ə-stər]

modify [COMPUT SCI] 1. To alter a portion of an instruction so its interpretation and execution will be other than normal; the modification may permanently change the instruction or leave it unchanged and affect only the current execution; the most frequent modification is that of the effective address through the use of index registers. 2. To alter a subroutine according to a defined parameter. ['mäd'ə,fī]

modify structure [COMPUT SCI] A statement in a database language that allows changes to be made in the structure of the records in a file. ['mäd'ə,fi,struk'chər]

modillion [ARCH] A horizontal bracket, usually in the form of a scroll with acanthus, supporting the corona under a cornice. [möd'ē-yən]

modling [ELECTR] Defect of magnetron oscillation in which it oscillates in one or more undesired modes. ['mōd'ēn]

modiolus [ANAT] The central axis of the cochlea. [mē'dē-ə'lēs]

modula-2 [COMPUT SCI] A general-purpose programming language that allows a computer program to be written as separate modules which can be compiled separately but can share a common code. ['mäj'ə-lə 'tū]

modular circuit [ELECTR] Any type of circuit assembled to form rectangular or cubical blocks that perform one or more complete circuit functions. ['mäj'ə-lər 'sərkət]

modular compilation [COMPUT SCI] The separate translation into machine language of the individual parts of a computer program, which are then combined into a single program by a linkage editor. ['mäj'ə-lər ,käm'pə'lā-shən]

modularity [COMPUT SCI] The property of functional flexibility built into a computer system by assembling discrete units which can be easily joined to or arranged with other parts or units. [,mäj'ə-lər'dē]

modular programming [COMPUT SCI] The construction of a computer program from a collection of modules, each of workable size, whose interactions are rigidly restricted. ['mäj'ə-lər 'prō,gram'ij]

modular structure [BUILD] A building that is constructed of preassembled or presized units of standard sizes; uses a 4-inch (10.16-centimeter) cubical module as a reference. [ELECTR] 1. An assembly involving the use of integral multiples of a given length for the dimensions of electronic components and electronic equipment, as well as for spacings of holes in a chassis or printed wiring board. 2. An assembly made from modules. ['mäj'ə-lər 'strek'chər]

modulate [ELECTR] To vary the amplitude, frequency, or phase of a wave, or vary the velocity of the electrons in an electron beam in some characteristic manner. ['mäj'ə,lāt]

modulated amplifier [ELECTR] Amplifier stage in a transmitter in which the modulating signal is introduced and modulates the carrier. ['mäj'ə,lād'əd 'ämp'lə,fir'er]

modulated carrier [COMMUN] Radio-frequency carrier wave whose amplitude phase or frequency has been varied according to the intelligence to be conveyed. ['mäj'ə,lād'əd 'kār'ē-tər]

modulated continuous wave [COMMUN] Wave in which the carrier is modulated by a constant audio-frequency tone. ['mäj'ə,lād'əd kən'tin'yōwəs 'wāv]

modulated Raman scattering [SPECT] Application of modulation spectroscopy to the study of Raman scattering; in particular, use of external perturbations to lower the symmetry of certain crystals and permit symmetry-forbidden modes, and the use of wavelength modulation to analyze second-order Raman spectra. ['mäj'ə,lād'əd 'rāmən ,skad'ərəj]

modulated stage [ELECTR] Radio-frequency stage to which the modulator is coupled and in which the continuous wave (carrier wave) is modulated according to the system of modulation and the characteristics of the modulating wave. ['mäj'ə,lād'əd 'stāj]

modulating codon [MOL BIO] A codon that controls the frequency of transcription of a cistron. ['mäj'ə,lād'əd 'kō,dōn]

modulating electrode [ELECTR] Electrode to which a potential is applied to control the magnitude of the beam current. ['mäj'ə,lād'əd i'lek,trōd]

modulating signal [COMMUN] Signal which causes a varia-

tion of some characteristics of a carrier. ('mäj-ə, läd-ɪŋ 'sig-nəl)

modulation [COMMUN] The process or the result of the process by which some parameter of one wave is varied in accordance with some parameter of another wave. [MECH ENG] Regulation of the fuel-air mixture to a burner in response to fluctuations of load on a boiler. (,mäj-ə'lä-shən)

modulation capability [ELECTR] Of an aural transmitter, the maximum percentage modulation that can be obtained without exceeding a given distortion figure. (,mäj-ə'lä-shən ,kä-pä-bil-ədē)

modulation code [COMMUN] A code used to cause variations in a signal in accordance with a predetermined scheme; normally used to alter or modulate a carrier wave to transmit data. (,mäj-ə'lä-shən ;kōd)

modulation crest [COMMUN] The peak amplitude of an amplitude-modulated wave. (,mäj-ə'lä-shən 'krest)

modulation-doped field-effect transistor See high-electron mobility transistor. (,mäj-ə'lä-shən 'dōpt 'fēld ī-fekt tran'zis-tər)

modulation-doped structure [SOLID STATE] An epitaxially grown crystal structure in which successive semiconductor layers contain different types of electrical dopants. (,mäj-ə'lä-shən 'dōpt 'strēk-chər)

modulation envelope [COMMUN] A curve drawn through the peaks of a graph showing the waveform of a modulated signal; represents the waveform of the intelligence carried by the signal. (,mäj-ə'lä-shən 'ēn-vō, lōp)

modulation factor [COMMUN] 1. In general, the ratio of the peak variation in the modulation actually used in a transmitter to the maximum variation for which the transmitter was designed. 2. In an amplitude-modulated wave, the ratio (usually expressed in percent) of the peak variation of the envelope from its reference value, to the reference value. Also known as index of modulation. 3. In a frequency-modulated wave, the ratio of the actual frequency swing to the frequency swing required for 100% modulation. (,mäj-ə'lä-shən ,fakt-ər)

modulation index [COMMUN] The ratio of the frequency deviation to the frequency of the modulating wave in a frequency-modulation system when using a sinusoidal modulating wave. Also known as ratio deviation. (,mäj-ə'lä-shən ,in, deks)

modulation meter [ENG] Instrument for measuring the degree of modulation (modulation factor) of a modulated wave train, usually expressed in percent. (,mäj-ə'lä-shən ,mēd-ər)

modulation rise [ELECTR] Increase of the modulation percentage caused by nonlinearity of any tuned amplifier, usually the last intermediate-frequency stage of a receiver. (,mäj-ə'lä-shən ,rīz)

modulation spectroscopy [SPECT] A branch of spectroscopy concerned with the measurement and interpretation of changes in transmission or reflection spectra induced (usually) by externally applied perturbation, such as temperature or pressure change, or an electric or magnetic field. (,mäj-ə'lä-shən spek'trōs-kōpē)

modulation transformer [ENG ACOUS] An audio-frequency transformer which matches impedances and transmits audio frequencies between one or more plates of an audio output stage and the grid or plate of a modulated amplifier. (,mäj-ə'lä-shən tranz-fōrmər)

modulation with a fixed reference [COMMUN] Phase modulation with a pilot carrier. (,mäj-ə'lä-shən with a 'fixt 'ref-rəns)

modulator [ELECTR] 1. The transmitter stage that supplies the modulating signal to the modulated amplifier stage or that triggers the modulated amplifier stage to produce pulses at desired instants as in radars. 2. A device that produces modulation by any means, such as by virtue of a nonlinear characteristic or by controlling some circuit quantity in accordance with the waveform of a modulating signal. 3. One of the electrodes of a spacistor. ('mäj-ə,läd-ər)

modulator crystal [OPTICS] Crystal which is used to modulate a polarized light beam by the use of the Pockel's effect; useful as a modulator in laser systems. ('mäj-ə,läd-ər ,krist-əl)

modulator-demodulator See modem. ('mäj-ə,läd-ər dē'mäj-ə,läd-ər)

modulator glow tube [ELECTR] Cold cathode recorder tube that is used for facsimile and sound-on-film recording; provides

a modulated high-intensity point source of light. ('mäj-ə,läd-ər 'glō,tüb)

module [AERO ENG] A self-contained unit which serves as a building block for the overall structure in space technology; usually designated by its primary function, such as command module or lunar landing module. [COMPUT SCI] 1. A distinct and identifiable unit of computer program for such purposes as compiling, loading, and linkage editing. 2. One memory bank and associated electronics in a computer. [ELECTR] A packaged assembly of wired components, built in a standardized size and having standardized plug-in or solderable terminations. [ENG] A unit of size used as a basic component for standardizing the design and construction of buildings, building parts, and furniture. [MATH] A vector space in which the scalars are a ring rather than a field. ('mäj-ə'lü)

modulo [MATH] 1. A group G modulo a subgroup H is the quotient group G/H of cosets of H in G . 2. A technique of identifying elements in an algebraic structure in such a manner that the resulting collection of identified objects is the same type of structure. ('mäj-ə,lō)

modulo N [MATH] Two integers are said to be congruent modulo N (where N is some integer) if they have the same remainder when divided by N . ('mäj-ə,lō 'en)

modulo N arithmetic [MATH] Calculations in which all integers are replaced by their remainders after division by N (where N is some fixed integer). ('mäj-ə,lō 'en ā'rith-mētik)

modulo N check [COMPUT SCI] A procedure for verification of the accuracy of a computation by repeating the steps in modulo N arithmetic and comparing the result with the original result (modulo N). Also known as residue check. ('mäj-ə,lō 'en 'chēk)

modulo-two adder [COMPUT SCI] A logical circuit for adding one-digit binary numbers. ('mäj-ə,lō 'tū 'ad-ər)

modulus [MATH] 1. The modulus of a logarithm with a given base is the factor by which a logarithm with a second base must be multiplied to give the first logarithm. 2. See absolute value. ('mäj-ə'lōs)

modulus of a congruence [MATH] A number a , such that two specified numbers b and c give the same remainder when divided by a ; b and c are then said to be congruent, modulus a (or congruent modulo a). ('mäj-ə'lōs ēv kōn'grü-əns)

modulus of compression See bulk modulus of elasticity. ('mäj-ə'lōs ēv kōm'preshən)

modulus of continuity [MATH] For a real valued continuous function f , this is the function whose value at a real number r is the maximum of the modulus of $f(x) - f(y)$ where the modulus of $x - y$ is less than r ; this function is useful in approximation theory. ('mäj-ə'lōs ēv kān-tin'ü-ədē)

modulus of decay [MECH] The time required for the amplitude of oscillation of an underdamped harmonic oscillator to drop to 1/e of its initial value; the reciprocal of the damping factor. ('mäj-ə'lōs ēv dī'kā)

modulus of deformation [MECH] The modulus of elasticity of a material that deforms other than according to Hooke's law. ('mäj-ə'lōs ēv dē,fōr'mäshən)

modulus of distance [ASTRON] The quantity $m - M$, where M is the absolute magnitude of a given star and m is its apparent magnitude. Also known as distance modulus. ('mäj-ə'lōs ēv 'dīs-tāns)

modulus of elasticity [MECH] The ratio of the increment of some specified form of stress to the increment of some specified form of strain, such as Young's modulus, the bulk modulus, or the shear modulus. Also known as coefficient of elasticity; elasticity modulus; elastic modulus. ('mäj-ə'lōs ēv ī,las'tis-ədē)

modulus of elasticity in shear [MECH] A measure of a material's resistance to shearing stress, equal to the shearing stress divided by the resultant angle of deformation expressed in radians. Also known as coefficient of rigidity; modulus of rigidity; rigidity modulus; shear modulus. ('mäj-ə'lōs ēv ī,las'tis-ədē ī 'shir)

modulus of resilience [MECH] The maximum mechanical energy stored per unit volume of material when it is stressed to its elastic limit. ('mäj-ə'lōs ēv ri'zil-yəns)

modulus of rigidity See modulus of elasticity in shear. ('mäj-ə'lōs ēv ri'jid-ədē)

modulus of rupture in bending [MECH] The maximum stress per unit area that a specimen can withstand without breaking when it is bent, as calculated from the breaking load under